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Editorial

Special Issue "Fluid Dynamics, Multi-Phase Flow, and Thermal Recovery Methods"

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Intricate fluid flow and transport phenomena in porous media are ubiquitous in natural processes and engineering systems. Therefore, it is essential to improve our understanding of these phenomena from both the point of view of experiments and of simulations [1–5]. The relevance of the topic "Fluid Dynamics, Multi-Phase Flow, and Thermal Recovery Methods" in the fields of petroleum engineering, mechanical engineering, and chemical engineering is proven by the numerous research papers, reviews, and journals worldwide that address this topic, as well as by many successful Special Issues published in MDPI journals. This Special Issue concentrates on studying different aspects of fluid dynamics in porous media by means of novel experimental techniques (such as microfluidic devices) and advanced modeling and simulation tools (such as computational fluid dynamics and pore network modeling).

In this Special Issue "Fluid Dynamics, Multi-Phase Flow, and Thermal Recovery Methods", Hu et al. (2020) investigated experimentally the impact of chemical agents (such as KCl and foams) on the pore blockage and wettability variation in sandstone reservoirs. Due to the monovalent cation property of potassium ion (K^+), coinjection of KCl and foams provided a higher oil recovery factor in sandstone reservoirs [6]. Shan and Zhu (2020) developed a mathematical model to analyze the role of various crucial parameters such as crack size, core parameter, and contact forces in the particle migration in tight sandstone reservoirs. They found that pressure gradient can be significantly affected by altering the fluidity index, particle size, and consistency coefficient under fixed conditions [7]. Nesic et al. (2020) developed a numerical model to consider the impact of suspended solids and water injection on the reservoir rock's permeability reduction. On the basis of the model predictions, situations were identified that can be used to decrease the effect of solid particles during the water injection impairment processes [8]. Lu et al. (2020) revisited the macroscopic parameters in the Brooks and Corey capillary pressure model using pore network simulations of a capillarity-controlled invasion percolation process. On the basis of systematic simulations, it was shown that the irreducible saturation depends on the pore space heterogeneity and topology [9].

Repko et al. (2020) developed a mathematical model to theoretically substantiate the liquid purification efficiency for a hydrocyclone for various screw swirlers blocks. They used wear-resistant and high-strength plastic ZEDEX ZX-324 for swirling block hydrocyclones to provide proper liquid flow [10]. Azma and Zhang (2020) considered a tributary channel and performed numerical simulations using 3D computational fluid dynamics that account for the large eddy turbulence. They found that the fluid flow distribution can be profoundly impacted by the width ratio (ratio of the tributary channel to the main channel) [11]. According to Wei and Zhang's (2020) findings, various sloshing conditions in filling processes were simulated to numerically analyze the phase-change and pressure curves for a liquid hydrogen storage tank. They found that sloshing conditions can facilitate the liquid flow during the filling processes [12]. Kong et al. (2020) performed an experimental investigation to analyze the liquid jet during the breakup process. It

Citation: Kharaghani, A.; Davarpanah, A. Special Issue "Fluid Dynamics, Multi-Phase Flow, and Thermal Recovery Methods". *Processes* **2021**, *9*, 842. https://doi.org/10.3390/pr9050842

Received: 10 May 2021
Accepted: 10 May 2021
Published: 12 May 2021

was concluded that the liquid jet Weber number has minimal impact on the droplet size distribution [13]. Ning et al. (2020) used a sintered plate and foam gun as microbubble generators to analyze the foam hydrodynamics in a bubble column. They found that the foam gun can provide a narrower average bubble chord length and a higher gas holdup during gas distribution [14]. Ehyaei et al. (2020) developed a mathematical model to simulate a geothermal plant as a renewable energy resource by implementing an organic Rankine cycle (ORC) coupled with a genetic algorithm. They concluded that the maximum output power and cycle efficiency should be optimized at high temperatures and fluid pressures in geothermal heat exchangers [15]. Shirmohammadi et al. (2020) simulated the CO2 removal from a monoethanol amine-based plant by Aspen HYSYS. The results were validated with field data from Kermanshah Petrochemical Industries Co. It was concluded that the capture efficiency, heat consumption, and plant working capacity can be functionalized in a similar way to the absorber inlet temperature and pressure [16].

To conclude, this Special Issue attempts to provide a diverse range of fluid dynamics-related problems, which are highly relevant in reservoir engineering and chemical engineering, but which have been underexplored in the academic literature.

Author Contributions: Writing—original draft preparation, A.K. and A.D.; writing—review and editing, A.K. and A.D. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Conflicts of Interest: The authors declare no conflict of interest.

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